

## **CHILDREN'S ENTERTAINMENT AND DEVELOPMENT TOY**

### ***Background***

#### ***Field of the Invention***

[1001] The invention relates to children's toys, and more particularly to children's toys that provide sensory output in response to performance of a task.

[1002] Many useful children's toys are designed to teach or test certain motor or problem solving skills. Many of these toys fail to keep the interest of children, often because they lack sufficient visual or audio stimuli. Children's short attention spans often render such toys obsolete as failed attempts produce frustration or as repeated successes produce boredom. Therefore, children regularly require new devices to maintain their attention for continued development of motor and problem solving skills. Many devices require assistance from parents or older children to set up or reset the toy after each successful performance of a task. Thus, there is a need for a device that provides stimulation, independence and recognition of success to encourage children's continued interest and efforts in skills development through use of the device.

### ***Summary of the Invention***

[1003] The invention includes a body having a base, an input opening, an output opening and a passage between the openings. The openings and passage are sized to allow an object to pass through each in sequence, triggering an actuator coupled to a sensory output generator. The passage includes a partial obstacle or interior surface features to redirect the movement of the

object along the path between the openings. The output opening may be fitted with a door to selectively retain or return deposited objects. The passage may include apertures or transparent portions for viewing the objects in motion. The passage may also be used to store objects. The body of the device may further include a handle and features or surfaces for stacking or other arranging of objects.

[1004] In embodiments of the invention, the device may include audio and visual sensory output. The output may include sounds, music, lights, images or movement. The device may include obstacles to selectively stop or release the object along its path through the passage. Selective operation of these obstacles may include movement of dials, buttons, switches, knobs, sliders, etc., and may also be accompanied by sensory output. The device may also include an on/off switch or volume, intensity, or mode controls for the sensory output generation system.

[1005] In embodiments of the invention, different input openings may require shape sorting, proper orientation of or differentiation between objects. The object may be a block, ball, or other easily grasped object. Movement of objects through the passage may be by gravity or by momentum imparted either manually or mechanically or by automatic operation of the device.

[1006] These and other aspects of the invention will become apparent from the following drawings and description.

### ***Brief Description of the Drawings***

[1007] The invention is described with reference to the accompanying drawings, wherein like reference numbers indicate like elements.

[1008] FIG. 1 is a perspective view of a device according to one embodiment of the invention.

– 3 –

[1009] FIG. 2 is a front view of a device according to the embodiment shown in FIG. 1.

[1010] FIG. 3 is a cross sectional view according to the embodiment of the invention shown in FIG. 2 taken along lines 3-3 in FIG. 2.

[1011] FIGS. 4A – 4F show a cross sectional view according to the embodiment of the invention shown in FIG. 2 taken along lines 3-3 in FIG. 2, depicting the operation of the device at various stages.

[1012] FIG. 5 is a side view of the device shown in FIG. 1 showing object stacking surface features.

[1013] FIG. 6 is a schematic illustration of an exemplary audio and visual output system.

[1014] FIGS. 7-9 are perspective views of alternative embodiments of the device of FIG. 1.

### ***Detailed Description***

[1015] Several embodiments of a children's entertainment device 100 incorporating the principles of the invention are shown in FIGS. 1-9. A general description of the device is presented first, followed by a description of various implementations.

[1016] FIGS. 1-5 are illustrations of an embodiment of the device 100. As illustrated in FIGS. 1-5, device 100 includes a body 110, with a base 112, a first end 120, and a second end 130. Body 110 also includes a passage 140 therethrough that can guide an object 104 through body 110, and has an input end 142 and an output end 144. An input opening 122 in body 110 at first end 120 communicates with input end 142 of passage 140, and an output opening 132 in body 110 at second end 130 communicates with output end 144 of passage 140. Passage 140 includes at least one structure that can redirect or change the direction of travel and/or the speed and/or direction of rotation of object 104 as it moves through passage 140. In the illustrated embodiment, this structure is referred to as redirector 146, and comprises a projection on the interior surface of passage 140.

[1017] Output opening 132 is fitted with a door 134 for selectively retaining or releasing deposited objects 104. Body 110 also includes viewing apertures 116 communicating with passage 140. Apertures 116 thus allow the user to view the motion of object 104 through passage 140 between openings 122 and 132.

[1018] An actuator 152 is disposed in passage 140 near output opening 132 and is positioned to be impacted by an object 104 passing through passage 140. Device 100 includes a sensory output generator 160 coupled to, and responsive to signals from, actuator 152. Sensory output generator 160 is coupled to a controller (not shown), and to a power supply 190, such as a battery. Power supply 190 can be one or more rechargeable or disposable batteries housed in a compartment which is accessible by removal or movement of power supply cover 192.

[1019] Referring again to FIGS. 1-5, actuator 152, when activated, triggers an audio or visual output or both audio and visual outputs. In the illustrated embodiment, the actuator 152 includes a compression switch. The actuator 152 is coupled to a sensory output generator 160. When the actuator 152 is depressed by object 104, audio or visual signals are generated and output through at least one video or audio transducer 164. Any number of transducers 164 may be positioned at various locations on or in device 100.

[1020] Although device 100 is described above as having a single actuator 152 positioned near output opening 132, device 100 may include multiple actuators 152. Actuators 152 may be placed near either opening 122 or 132 or along the passage 140, or at combinations of these locations. The audible and/or visual output from sensory output generator 160 triggered by activation of one actuator may be the same as or different than the output triggered by activation of a different actuator 152.

[1021] Additionally, although actuator 152 is described above as including a compression switch, it may be a motion detector, magnetic sensor, photodetector, reed switch, contact switch, or other similar actuator or sensor to detect contact, motion, or position of an object 104 relative to device 100. For example, a photodetector may be placed in the openings 122, 132 to detect passage or motion of an object 104 therethrough. Alternatively, actuators 152 may be located so as to respond to objects 104 contacting the redirectors 146 or passing through openings 122, 132

– 5 –

or passage 140 to cause different outputs as a function of the combination of actuators 152 triggered by object 104. A specific output from sensory output generator 160 may be uniquely associated with a particular actuator input sequence or combination.

**[1022]** Alternatively, actuator 152 and/or sensory output generator 160 may be part of object 104 rather than device 100. Any of the sensors or actuators 152 discussed above may be incorporated into object 104.

**[1023]** FIG. 6 shows a functional block diagram of an example of an audio or visual output system suitable for use with device 100 of FIGS. 1-5. As shown in Figure 6, the device 100 includes a controller 170, an input block 150, a control block 172, and an output block 180. In response to user input via the input block 150, the control block 172 controls the output of selected output, such as musical notes, sound effects, light patterns or combinations of musical notes, sounds, and light patterns, from the output block 180.

**[1024]** Output block 180 includes output content 182, which may be audio content and/or video content. Audio content can be, for example, in either digital or analog form, musical tones, speech (recorded, sampled or synthesized), or sounds (including recorded natural sounds, or electronically synthesized sounds). Video content can be, for example, in analog or digital form, still or video images, or simply control signals for activation of lamps or other light-emitting devices.

**[1025]** The output content 182 can be communicated to a user for hearing, or viewing, by output generator 160, which can include an audio output generator and/or a video output generator. Output generator 160 can include an audio and/or video signal generator 162, which converts audio and/or video output content 182 into signals suitable for driving an audio and/or video transducer 164, such as a speaker, for converting the signals into audible sound waves or a display screen or lights, for converting the signals into visible light waves. Output generator 160 can also include moving physical objects, such as miniature figures, to produce visual stimulus to the user. The selection of output content 182, and the performance attributes of the output generators 160, should be driven by the goal of generating output that is appealing or entertaining to a child user.

**[1026]** Control block 172 controls output block 180, selecting the output content 182 to be output and activating the output generator 160 to operate on the selected output content 182. The operation of control block 172 can be governed by control logic 174, which can be, for example, computer software code. Control logic 174 can select content to be output repetitively or non-repetitively, and/or randomly or in fixed sequences. Video and/or audio output can be coordinated to enhance the desired entertaining effect.

**[1027]** User input block 150 can include a mode selector (not shown), and at least one actuator 152, by which the user can provide input to control block 172 to influence the selection of output content 182 and to initiate its output. A mode selector allows the user to select from among output modes. Illustrative output modes include variations of audio and visual outputs or combined outputs. For example, the output content 182 can include a set of musical tones and a set of sound effect segments. Alternatively, output content 182 can include a selected sequence of illumination instructions for lamps. Control logic 174 includes sets of sequences in which the musical tones can be output to produce musical tunes. Various modes of light operation may be selected. A program can include a predetermined sequential output of the sets of tone sequences, producing a sequence of musical tunes. Lamps can be illuminated in response to a set of illumination instructions correlated with the playing of the tunes.

**[1028]** The components of sensory output generator 160 may be placed in any suitable locations in or on device 100. Audio and/or video transducers 164 may be placed in various locations in or on device 100 and have location- or actuator-specific sounds

**[1029]** In addition to input actuators 152, sensory output generator 160 may be coupled to on/off and/or mode selectors or switches and/or volume or intensity adjustment controls to modify the effect of the audio or visual outputs. Although the actuator 152 is described above as causing electronic output, other outputs such as mechanical sounds or movement are contemplated by the present invention.

**[1030]** The operation of device 100 is described with reference to FIGS. 4A-4F. A user inserts an object 104 into input opening 122 and releases the object. The object 104 falls under the influence of gravity into passage 140 via inlet end 142. As the object 104 passes through

- 7 -

passage 140, it encounters redirectors 146. Upon striking each redirector 146, object 104 rebounds, changing direction. The impact with redirector 146 can also impart a tumbling motion, or change the speed or direction of the tumbling motion or rotation that object 104 had before encountering the redirector. As it nears output end 144 of passage 140, object 104 strikes output actuator 152, activating the actuator 152. In turn, actuator 152 initiates operation of sensory output generator 160, which then produces sensory output. Object 104 continues through passage 140, leaving through output end 144 and exiting body 110 via output opening 132.

**[1031]** Some additional, optional features of device 100 are described with reference to FIG. 5. Device 100 may include one or more surfaces or structures for stacking or arranging one or more objects 104. For example, a handle 118 is coupled to first end 120 of body 110, and allows a user to carry device 100. Handle 118 may be pivotally mounted to body 110 and may be disposable in an orientation shown in FIG. 5 in which one or more objects 104 can be supported on the handle 118. Similarly, output opening door 134 may receive or support objects 104 in its open position. Alternatively, or additionally, a platform 114 may be formed in, or coupled to, body 110 and receive or support one or more objects 104.

**[1032]** Body 110 may be configured to resemble any one of many shapes or objects, including an animal, building, vehicle, geographic formation, landmark, etc. In the embodiment illustrated in FIGS. 1-5, device 100 is configured to resemble a giraffe. Thus, body 110 is formed to resemble the giraffe's body, with passage 140 formed in the giraffe's neck, input opening 122 formed in the head, apertures 116 are shaped and located to resemble the giraffe's spots, and a projection is disposed adjacent platform 114 to resemble a tail. Graphic indicia are placed on body 110 to depict facial features, etc.

**[1033]** The object 104 may be any one of many shapes. In the illustrated embodiment, object 104 is shown as a cubic block. Alternatively, object 104 may be formed as a sphere, pyramid, extruded geometric section, etc. Alternatively, object 104 may be formed to resemble any one of many objects typically recognized by children, such as fruit, vegetables, animals, coins, etc.

- 8 -

**[1034]** FIG. 7 shows an alternative embodiment in which a device 200 includes multiple input openings 222, and/or multiple output openings 232 in communication with one or more passages 240. In the embodiment shown in FIG. 7, the input openings 222 are of different shapes, requiring shape sorting of correspondingly shaped objects 204. The input openings 222, passages 240, and the output openings 232 can be combined in various permutations. For example, each passage 240 may be coupled with a single input opening 222 and a single output opening 232 thus providing multiple independent paths for an object 204. Alternatively, each passage 240 may be coupled to multiple (or all) input openings 222 and/or output openings 232.

**[1035]** FIG. 8 shows an alternative embodiment in which a device 300 has an arcuate or serpentine shaped passage 340 with a substantially circular cross section to accommodate a substantially spherical object 304. Redirection of object 304 may be by redirectors 346 and/or by variations in the passage shape, size, or contour etc.

**[1036]** FIG. 9 shows an alternative embodiment in which a device 400 includes at least one input opening 422, at least one passage 440, and at least one output opening 432. Passage 440 includes a moveable redirector 446 operably coupled to a control 448. Arrows indicate a range of redirector positions or movements in which redirector 446 may be used to slow, halt, or release object 404 as it travels through passage 440. Alternatively, redirector 446 may be used to guide or impart momentum to object 404 causing it to enter an alternate passage 440 or causing it to change direction, rotation, orientation, etc. Actuators 452 may be located in various passages 440 or in various locations within any number of passages 440 with variable sensory outputs provided in response to triggering of different actuators 452 or series of actuators 452. Redirector control 448 may be a manual actuator, a motorized actuator, etc., and may be operated by the user or by automatic operation of the device 400.

**[1037]** In the illustrated embodiments, the various components of the devices 100, 200, 300, 400 are formed of plastic materials, but any other material suitable for the intended use can be utilized.

**[1038]** Referring again to FIGS. 1-5, although redirectors 146 are shown as projections formed on the inner wall of passage 140, they may be formed as posts projecting into, or



– 9 –

completely across, passage 140, and may be of any shape or size. They may be rigid, as illustrated, or deformable and/or resilient.

**[1039]** While particular, illustrative embodiments of the invention have been described, numerous variations and modifications exist that would not depart from the scope of the invention. For example, device 100 can be configured to require manual or mechanized agitation to convey object 104 through passage 140. Although passage 140 is illustrated as a substantially vertical hollow body, in alternative embodiments, passage 140 may be of any shape, configuration, orientation, and/or cross-section that accommodates movement of object 104 between openings 122 and 132. For example, the passage 140 may follow an arcuate, spiraling, tortuous, or alternating incline path between openings 122 and 132.

### ***Conclusion***

**[1040]** While various embodiments of the invention have been described above, it should be understood that they have been presented by way of example only, and not limitation, and it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention. Thus, the breadth and scope of the invention should not be limited by any of the above-described embodiments, but should be defined only in accordance with the following claims and their equivalents.